

## APPLIED ISOTOPE TECHNOLOGIES, Inc.

### SIDMS AT A GLANCE:

- The only speciation method (EPA SW846 - Method 6800) certified by the US Environmental Protection Agency
- Enables quantitative measurement without a calibration curve
- Provides the ability to make dynamic measurements even when a species is 99% converted to another
- Affords assessment, validation and correction for transformations, losses and protocols during sample preparation and analysis
- Affordable, ready-to-use reagents available with Certificates of Analysis and Quality



### Cr Analysis Kits – Accurate, Trace-Level Speciated Analysis of Chromium-VI

#### Background

Used around the world for more than 100 years in metal alloys and other compounds, and in the tanning and metal plating industries, Chromium (Cr), requires special attention as one of the most worrisome environmental hazard on earth. Although Cr occurs in three forms, Hexavalent Chromium Cr(VI) is the most toxic and carcinogenic species of the three. Cr(VI) can enter the body when people breathe air, eat food or drink water containing it. It may also be found in house dust and soil which can be ingested or inhaled.

The process by which Cr(VI) is reduced to Cr(III) can cause many forms of DNA damage. Recently, identified potential mechanisms of genotoxicity for intracellular Cr(III) indicate that Cr(III) induced DNA-DNA interstrand cross-links are the lesions responsible for blocking DNA-replication. The observed mutagenicity of the recently studied adducts complements pathway in Cr(VI) carcinogenicity. Additional studies that are underway are investigating the relative importance of oxidative and Cr(III) pathways in genetic damage caused by exposure to Cr(VI). Accurate measurement of Cr(VI) is critically needed, yet not achieved at the required levels of sensitivity.

#### Facing the Challenge: Speciation Analysis with SIDMS

Accurate measurement of Cr(VI) presents a major challenge because of dynamic interconversion, or speciation, that occurs between Cr(VI) and Cr(III) during sampling, storage, sample preparation. Even the measurement protocol, itself, could cause transformations and therefore may produce data that are inaccurate, irrelevant or legally indefensible.

The Speciated Isotope Dilution Mass Spectrometry (SIDMS) technology, certified in 1998 under EPA SW846 Method 6800, is a powerful method that addresses the speciation challenges and provides accurate measurement of Cr(VI)<sup>1</sup>.

#### The Solution: Cr(VI) Speciation Analysis Kits from AIT

AIT's Chromium Analysis Kits provide all that are needed to rapidly, conveniently and economically make speciated measurements for Cr(VI) using an Inductively Coupled Plasma Mass Spectrometer (ICP-MS).

<sup>1</sup> According to comments in the "What's New?" Section of the EPA website, "... [SIDMS] is currently the **only available means to make accurate and defensible speciated measurements**. <http://www.epa.gov/epaoswer/hazwaste/test/news2.htm>

### Chromium Analysis Kits – Value Pack (VP)

#### **Part No. 5200**

VP Speciated Chromium Analysis Kit, for ICP-MS, includes:

- Two enriched stable isotope spikes (ESIS™, in specially designed, inert, ready-to-use containers. No pipeting needed: simply break the seal, mix-in-place, equilibrate and use - with maintaining accuracy up to four significant digits.
- Proprietary software that will permit calculations for up to two species (two orders of freedom)
- Certificate of Analysis
- Certificate of Quality
- Instruction Manual
- Use-license<sup>2</sup>

### Chromium Analysis Kits – Research Pack (RP)

#### **Part No.6200**

RP Speciated Chromium Analysis Kit, for ICP-MS, includes:

- Two stable isotope spikes, in specially designed, inert, re-usable bottle, each containing 30 µg of enriched stable isotope spikes in 30 mL in ready-to-use solution. Special sealing, storage and handling techniques enable removal of spike aliquots and analyses – while maintaining accuracy up to six significant digits.
- Proprietary software that will permit calculations for up to two species (two orders of freedom)
- All other necessary consumables and tools
- Certificate of Analysis, Certificate of Quality
- Instruction Manual
- Use-license<sup>2</sup>

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#### **Notes:**

\* AIT features stable isotopes supplied by Oak Ridge National Laboratories.

\* Different concentrations and volumes of isotopic spikes may be purchased as special orders and are subject to availability of spike and resources. Contact AIT for a quote and delivery estimate.

\* All specifications are subject to change without notice.

\* ESIS is a trademark of Applied Isotope Technologies, Inc.

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<sup>2</sup> Each purchase allows the consumer to use the contents of each kit on an ICP-MS instrument for speciated analysis following the SIDMS methods. This consumer license is provided by AIT under the terms of its exclusive license to one or more worldwide patents related to SIDMS and derivative patents.